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Title: **An Evaluation of SCR Catalyst Performance in PRB Applications**

Author: Keith E. Harrison
Research & Environmental Affairs
Southern Company Services, Inc.
P.O. Box 2641, BIN 14N-8195
Birmingham, AL 35291
Email: keharris@southernco.com
Phone: 205/257-6832
Fax: 205/257-5367

Formulating a catalyst management plan is integral part of any SCR system design. In order to develop this plan, you must be able to predict the catalyst performance for that particular application as accurately as possible. Currently, there is little world-wide experience operating SCR systems on coal-fired utility boilers burning PRB coal, and designs are being developed on extrapolated data from SCR catalyst vendors. In an effort to develop the best-cost compliance strategy for the Southern Company system, a research program was initiated to determine if installing SCRs on units burning PRB coal was economically feasible.

The objective of the study was to provide a measure of the rate of catalyst deactivation to allow a more accurate prediction of catalyst replacement costs, and ultimately the cost of Southern Company system compliance for NO_x emissions. Another goal of the catalyst testing program was to gain information on the catalyst deactivation mechanism resulting from PRB fly ash exposure. To accomplish this, an initial testing phase was begun at the small catalyst coupon scale. After determining the flow profile at the test location, catalyst coupon holders were placed into the economizer outlet duct and exposed to PRB fly ash. These 1.5" square, flat coupon samples, provided by several different catalyst vendors, were removed at 1000-hour intervals. The samples were then sent back to the vendor for surface and activity analysis to determine the effect of the fly ash constituents on catalyst performance.

While much was learned regarding the mechanism for deactivation, it was determined during this phase of testing that the coupon test method proved to be inadequate for predicting representative relative activity changes. Turbulent and maldistributed flow regimes across the samples resulted in questionable data to the extent that a larger, more defined study was proposed. Southern Company engineers and researchers then set about designing an SCR pilot plant to further investigate this issue. The design was based on the "small reactors" used in the previous DOE/Southern Company SCR Demonstration at Gulf Power Company's Plant Crist. The \$1.5M pilot facility, installed at Alabama Power Company's Plant Miller, Unit 4, extracts a common sample of flue gas from the economizer outlet and supports three separate reactor trains operating at 400 scfm per reactor. Each reactor train consists of one flow-rectifying (dummy) layer and two active catalyst layers. Each catalyst layer contains a ~13" sq. module of full-size catalyst elements which are being periodically removed and sent back to the corresponding vendor for analysis as a part of this ongoing research program.

The current test program is scheduled to run through August 2001. At the end of the test program, Southern Company plans to use this pilot facility to investigate other issues with SCR catalyst, including effects on mercury oxidation, as well as to research and develop other potential catalyst systems or system improvements. Southern Company researchers, along with EPRI and a group of other utilities, are also investigating possible mitigation techniques for potential accelerated deactivation in PRB applications.